

PATENT COOPERATION TREATY
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INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

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Applicant's or agent's file reference FR920020015/CB	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/EP 03/10082	International filing date (day/month/year) 13.08.2003	Priority date (day/month/year) 12.09.2002
International Patent Classification (IPC) or both national classification and IPC G06F9/40, G06F9/52		
Applicant INTERNATIONAL BUSINESS MACHINES CORPORATION et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 8 sheets, including this cover sheet.

This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 6 sheets.

3. This report contains indications relating to the following items:

- I Basis of the opinion
- II Priority
- III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV Lack of unity of invention
- V Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI Certain documents cited
- VII Certain defects in the international application
- VIII Certain observations on the international application

Date of submission of the demand 13.01.2004	Date of completion of this report 30.11.2004
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I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-59 as originally filed

Claims, Numbers

1-24 received on 17.11.2004 with letter of 17.11.2004

Drawings, Sheets

1/7-7/7 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- the language of publication of the international application (under Rule 48.3(b)).
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- the description, pages:
- the claims, Nos.:
- the drawings, sheets:

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5. This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	3, 5, 8-10, 12-14, 16-19, 21
	No: Claims	1, 2, 4, 6, 7, 11, 15, 20, 22, 23, 24
Inventive step (IS)	Yes: Claims	
	No: Claims	1-24
Industrial applicability (IA)	Yes: Claims	1-24
	No: Claims	

2. Citations and explanations

see separate sheet

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Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1 Documents

Reference is made to the following documents:

- D1: EP-A-0 969 363 (MICROSOFT CORP) 5 January 2000 (2000-01-05)
- D2: US-A-5 561 797 (GILLES ROBERT A ET AL) 1 October 1996 (1996-10-01)
- D3: US-A-6 094 688 (GUPTA PRASHANT ET AL) 25 July 2000 (2000-07-25)

2 Objections with respect to Article 33(2) PCT

- 2.1 The document D1, which is considered to represent the closest prior art to the subject-matter of claim 1, discloses (the references in parentheses applying to this document):

A data processing system comprising:

at least one resource manager for managing changes to respective system resources (column 2, paragraph [0006], lines 31-34: *resource managers*) in accordance to a commit/backout protocol (column 4, paragraph [0013], line 26: *two phase commit protocol*), and

a resource manager coordinator for coordinating commit/backout activities of the at least one resource manager (column 12, paragraph [0039], lines 47-52: *transaction manager*), and

at least one process resource manager, working in accordance to a commit/backout protocol, for managing the execution and the compensation of non-compliant processes not complying to the commit/backout protocol (column 3, paragraph [0009]: *non-transactional resources, legacy resource managers*; paragraph [0010]: *compensating resource management*) due [to] the access to non-compliant resources (column 3, lines 31-32: *non-transactional resources*) or the invocation of a non-compliant protocol (column 3, line 32: *legacy resource managers*).

compensation services of the at least one process resource manager (column 3, line 56 - column 4, line 8: a *compensating resource manager* is provided for each non-compliant or legacy durable resource) being coordinated by the resource manager coordinator according to the commit/backout protocol,

the at least one process resource manager automatically determining, upon receipt of a backout request, a sequence of compensation actions to be performed so as to backout actions performed during the execution of the non-compliant processes, and managing the execution of said compensation actions (column 4, paragraph [0013]: *CRM compensator*).

- 2.2 The subject-matter of claim 1 is therefore not new (Article 33(2) PCT).
- 2.3 The subject-matter of claims 23 and 24 corresponds in terms of system- and method-features to the subject-matter of claim 1. The objections raised in respect of claim 1 therefore apply accordingly to claims 23 and 24.
- 2.4 As to claim 2, the feature of the compensation actions being inverse actions, each inverse action being the inverse of a respective action performed during the execution of the non-compliant processes, merely restates a common definition of the term "*compensating action*" (see also document D1, column 3, lines 44-46: "... *compensating action to reverse each normal action ...*").
- 2.5 As to claim 4, the feature of postponing the compensation actions with respect to the backout activity of the resource managers upon receipt of a backout request is disclosed in D1 (column 27, paragraph [0095]: *deferred recovery*).
- 2.6 As to claim 6, the additional feature of a information recording service for recording information concerning the actions performed during the execution of at least the non-compliant processes, the process resource manager automatically determining the sequence of compensation actions on the basis of the information recorded by the information recording service, is disclosed in D1 (column 19, line 49 - column 20, line 41).
- 2.7 As to claim 7, the feature of bringing the data processing system either into a state corresponding to an initial state of the system or into a state different from the

initial system state being determined by the process resource manager on the basis of the information recorded by the information recording service, merely refers to the well-known concept of "semantic compensation".

- 2.8 As to claim 11, the feature of a process recovery service is disclosed in D1 (column 24, paragraph [0083]: *recovery engine*).
- 2.9 As to claim 15, processes running on at least one distinct data processing system and processes running on the data processing system but not complying with the commit/backout protocol, are disclosed in D1 (column 12, lines 51-52: "... *resource manager reside on more than one computer in a distributed network ...*").
- 2.10 As to claim 20, a connectivity service exploited by the process resource manager for managing communication between the data processing system and the at least one distinct data processing system is disclosed in D1 (column 8, paragraph [0025]).
- 2.11 As to claim 22, a transaction manager system for managing transactions is disclosed in D1 (column 12, paragraph [0039], lines 47-52: *transaction manager*).

3 Objections with respect to Article 33(3) PCT

- 3.1 As to claim 3, performing the compensation actions in parallel to the backout activity of the resource managers, coordinated by the resource manager coordinator, is an obvious way to exploit a major advantage of distributed processing systems.
- 3.2 As to claim 5, the feature of managing the execution of the non-compliant processes and of the compensation actions by means of at least one task, associated with either one unit of work or a plurality of correlated unit of works, by the resource manager, is an implementation detail that uses multiprocessing features that are present in most operating systems in a straightforward manner.
- 3.3 As to claim 8, the feature of a process classification service for classifying the processes to be executed and determining if a process is a non-compliant process, has already been used for the same purpose in a similar technical context, see for example document D2 (column 6, lines 30-35: *monitor service*; column 7, lines 6-10: *resource table*). The skilled person would therefore add this

feature to the system of D1 if the same advantage is to be achieved.

- 3.4 As to claim 9, using a process catalog for providing a catalog of process types and, for the process types in the catalog, information for enabling the process resource manager to automatically determine the sequence of compensation actions on the basis of the recorded information, is an implementation detail which the skilled person would choose in accordance with the circumstances and without exercising inventive skill.
- 3.5 As to claim 10, a process type for which, upon receipt of a backout request, the process resource manager does not directly activate the sequence of compensation actions, but waits for a successive re-launch of the process, is an implementation detail which the skilled person would select in accordance with the type of non-compliant process involved and without exercising inventive skill.
- 3.6 As to claim 12, the feature of an error recovery service implementing an error recovery procedure for managing error conditions occurring during the execution of a process has already been used for the same purpose in a similar technical context, see for example document D3 (column 10, lines 23-43: "*error and exception service*").
- 3.7 As to claim 13, dependence of the error recovery procedure on the information provided by the information recording service is obvious, as this information is recorded for the very purpose of error recovery.
- 3.8 As to claim 14, performing a process recovery procedure as part of an error recovery procedure is a commonplace feature present in many error recovery procedures.
- 3.9 As to claim 16, the feature of a system recovery service implementing a system recovery procedure for establishing a synchronicity point between the data processing system and the at least one distinct data processing system is a widely used feature in distributed transaction processing systems and has already been used for the same purpose in a similar technical context, see for example document D2 (column 5, lines 14-23).
- 3.10 The subject-matter of claims 17, 18, 19 and 21 relates to different details of the invocation of the system recovery procedure that fall within the common practice

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of the skilled person.

CLAIMS

1. A data processing system comprising:
at least one resource manager (RM) for managing changes to respective system resources in accordance to a commit/backout protocol, and
a resource manager coordinator (RMC) for coordinating commit/backout activities of the at least one resource manager,
characterised by comprising
at least one process resource manager (ERM), working in accordance to a commit/backout protocol, for managing the execution and the compensation of non-compliant processes not complying to the commit/backout protocol due the access to non compliant resources or invoked by a non compliant protocol,
compensation services of the at least one process resource manager (ERM) being coordinated by the resource manager coordinator according to the commit/backout protocol, the at least one process resource manager (ERM) automatically determining, upon receipt of a backout request, a sequence of compensation actions to be performed so as to backout actions performed during the execution of the non-compliant processes, and managing the execution of said compensation actions.
2. The data processing system according to claim 1, in which said sequence of compensation actions consists in a sequence of inverse actions, each inverse action being the inverse of a respective action performed during the execution of the non-compliant processes.
3. The data processing system according to claim 1, in which upon receipt of a backout request, the compensation actions are performed in parallel to the backout activity of the resource managers, coordinated by the resource manager coordinator.

4. The data processing system according to claim 1, in which upon receipt of a backout request, the compensation actions are postponed with respect to the backout activity of the resource managers.

5. The data processing system according to claim 1, in which the process resource manager manages the execution of the non-compliant processes and of the compensation actions by means of at least one task, associated with either one unit of work or a plurality of correlated unit of works.

6. The data processing system according to claim 1, comprising an information recording service (LOG) for recording information concerning the actions performed during the execution of at least the non-compliant processes, the process resource manager automatically determining a sequence of compensation actions on the basis of the information recorded by the information recording service.

7. The data processing system according to claim 6, in which said sequence of compensation actions brings the data processing system into one among a first system state, corresponding to an initial state of the system prior to the actions performed by the non-compliant processes, and a second system state different from the initial system state, said second system state being determined by the process resource manager on the basis of the information recorded by the information recording service.

8. The data processing system according to claim 7, comprising a process classification service (CATS,CAT,BRM) for classifying the processes to be executed and determining if a process is a non-compliant process.

9. The data processing system according to claim 8, in which the classification service comprises a process catalog (CAT) providing a catalog of process types and, for the process types in the catalog, information for enabling the process resource manager automatically determining the sequence of compensation actions on the basis of the recorded information.
10. The data processing system according to claim 9, in which said process types include a first process type for which, upon receipt of a backout request, the process resource manager does not directly activate the sequence of compensation actions, but waits for a successive re-launch of the process.
11. The data processing system according to claim 6, comprising a process recovery service (TSR) implementing a process recovery procedure for managing backout requests issued during the execution of a process.
12. The data processing system according to claim 6, comprising an error recovery service (ERR) implementing an error recovery procedure for managing error conditions occurring during the execution of a process.
13. The data processing system according to claim 12, in which the error recovery procedure depends on the information provided by the information recording service.
14. The data processing system according to claim 13, in which the error recovery procedure comprises performing the process recovery procedure.
15. The data processing system according to claim 1, in which the non-compliant processes comprises at least one among a processes running on at least one distinct data processing system (C-SYS1,C-SYS2) and processes running on the data

processing system but not complying with the commit/backout protocol.

16. The data processing system according to claim 15, comprising a system recovery service (SYSR) implementing a system recovery procedure for establishing a synchronic point between the data processing system and the at least one distinct data processing system.

17. The data processing system according to claim 16, in which the system recovery procedure is invoked by the process resource manager.

18. The data processing system according to claim 17, in which the system recovery procedure is invoked at the startup of the data processing system.

19. The data processing system according to claim 16, in which the system recovery procedure includes a negotiation phase between the data processing system and the at least one distinct data processing system, said negotiation phase comprising negotiating identification information of the processes directed to the distinct data processing system.

20. The data processing system according to claim 15, comprising a connectivity service (CNCT) exploited by the process resource manager for managing communication between the data processing system and the at least one distinct data processing system.

21. The data processing system according to claim 1, comprising a service for managing the automatic re-execution of processes.

22. The data processing system according to any one of the preceding claims, comprising a transaction manager system (TM) for managing transactions.

23. A data processing system for managing transactions, the system comprising:

a first transaction management system, comprising:

a plurality of resource managers, each one responsible of managing respective system resources according to a commit/backout protocol;

characterized by comprising

at least one process resource manager (ERM), working in accordance to a commit/backout protocol, for managing the execution and the compensation of non-compliant processes not complying to the commit/backout protocol due the access to non compliant resources or invoked by a non compliant protocol;

compensation services of the at least one process resource manager (ERM) being coordinated by the resource manager coordinator according to the commit/backout protocol, the at least one process resource manager (ERM) automatically determining, upon receipt of a backout request, a sequence of compensation actions to be performed so as to backout actions performed during the execution of the non-compliant processes, and managing the execution of said compensation actions;

Said compensation services of the at least one process resource manager (ERM) being coordinated by the resource manager coordinator in respect to transactions to be carried out by at least one second transaction management system distinct from the first system, the process resource manager managing backout activities of the transactions carried out by the at least one second system.

24. A method of integrating compliant processes complying to a commit/backout protocol with non-compliant processes non complying with the commit/backout protocol, comprising:

providing at least one resource manager (RM) for managing changes to respective system resources in accordance to the commit/backout protocol, and

providing a resource manager coordinator (RMC) for coordinating the commit/backout activities of the at least one resource manager,

characterized by comprising

providing at least one process resource manager (ERM) working in accordance to a commit/backout protocol, for managing the execution and the compensation of non-compliant processes not complying to the commit/backout protocol due to the access to non compliant resources or invoked by a non compliant protocol,

the resource manager coordinating the compensation services of the at least one process resource manager (ERM) according to the commit/backout protocol, for managing the execution of the non-compliant processes, the at least one process resource manager (ERM) automatically determining, upon receipt of a backout request, a sequence of compensation actions to be performed so as to backout actions performed during the execution of the non-compliant processes, and managing the execution of said compensation actions.